

Dana Server

User Manual

Version 1.0

Description

Dana Server is a flexible Digital Audio Network Appliance (Dana) designed for the professional audio market. In today's world of increasing call for customizable solutions, DSP4YOU answers the needs of customers looking for plug & play solutions fitting their sophisticated A/V systems. Based on a server + plug-in architecture, Dana enables customization for both hardware and software. Our philosophy is simple: "Pick and choose and only pay for the features you need". On the hardware side, users can select from a wide range of analog and digital I/O cards to fit with your audio sources/destinations. On the software side, simply configure one of the pre-built plug-in for a wide range of applications ranging from a BGM processor playing audio from a USB drive to a speaker processor for audio distribution.

Hardware

- 32-bit Floating point DSP – Analog Sharc
- Flexible I/O configuration in 4 slots
- Digital Audio Module slot for AVB/USB I/O card
- 24-bit conversion
- 48 KHz / 96 KHz sampling rate
- Ethernet AVB (IEEE1722) module
- 16 configurable GPIO
- 2GB on-board flash storage for recovery
- External + Internal USB drive for storage
- 10/100 Ethernet connectivity
- RS232 port
- Euro-style detachable connectors

Control

- Adobe Flash based web configuration
- SSL protected Web interface
- Platform independent (PC/Mac/Linux)
- Live/Real time configuration over Ethernet/Internet connection
- Bonjour powered platform allows convenient naming of the unit
- DHCP/Static/Auto-IP configuration
- Embedded FTP server saves configuration
- Extensive logs saved on flash
- Third party control over telnet/rs232
- Remote Backup/Recovery/Upgrade
- Secure user accounts
- Advance preset configuration

System Diagram

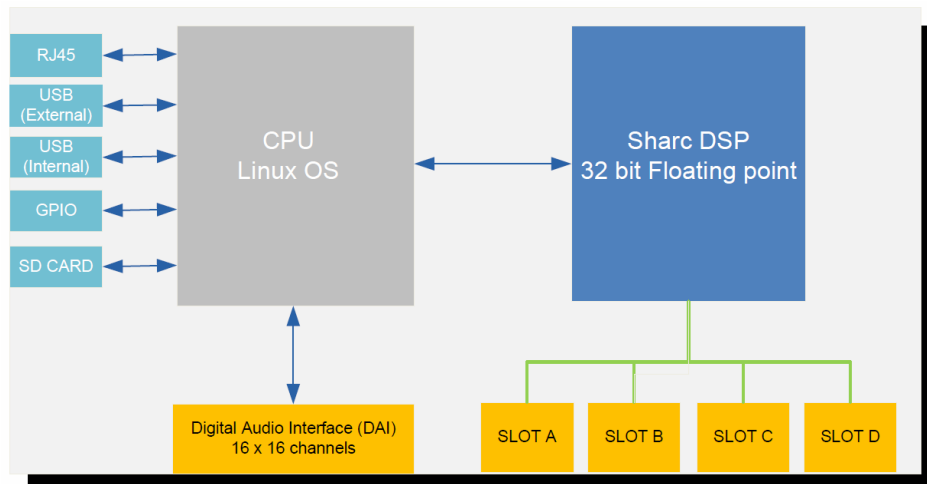


Table of Content

1	Product Overview	4
1.1	Front Panel Description	4
1.2	Rear panel description	4
1.3	Feature description	5
1.3.1	Digital Signal Processing	5
1.3.2	Audio Video Bridging	5
1.3.3	Multi-track USB Audio playback/recording	5
1.3.4	Networking at its core	6
1.3.5	USB audio music playback	6
2	Setup guide	7
2.1	Dana box content and mounting instructions	7
2.2	Connectivity	7
2.2.1	Network	7
2.2.2	Analog audio I/O card	7
2.2.3	Digital Audio I/O card	8
2.2.4	Serial port (RS232)	8
2.2.5	GPIO	9
2.2.6	AC power connection	9
2.3	System setup requirements	9
2.3.1	PC / Mac / Linux systems	9
2.3.2	Control Network minimum requirements	9
2.4	Step by Step setup guide	9
3	System Configuration	10
3.1	Web interface overview	10
3.2	Dana Server configuration	11
3.2.1	Audio settings	11
3.2.2	AVB Configuration	16
3.2.3	GPIO programming	18
3.2.4	Preset Building	19
3.2.5	System settings	20
3.2.6	User access	22
3.3	AVB End point configuration	22
3.3.1	E-line/E-power configuration panel	22
3.4	Remote networking configuration	24
3.4.1	Firewall configuration	24
3.4.2	Port forwarding	24
4	Open Control Protocol (OCP) for 3 rd party control	25
4.1	General description	25
4.1.1	Commands strings	25
4.1.2	Reply string	25
4.2	Recovery of IP address and hostname	25
5	Technical specifications	26
5.1	Dana Server specifications	26
5.2	I/O card specifications	27
5.3	Digital Audio Interface Specifications	28

1 Product Overview

1.1 Front Panel Description



1. **Signal LED** illuminates, clips depending on the input/output signal. The three LED states indicate:

- OFF state: No signal
- ON state: Signal below -40dBu threshold.
- Blinking state: Signal above -40dBu threshold

2. **Clip LED** illuminates when the signal is 3dB below the clipping threshold of the audio input/output interface. Please refer to the card specifications for more information on the maximum input/output.

3. **SYSTEM LED** after complete power cycle sequence (20sec) illuminates when unit is fully operating. An OFF state indicates an internal failure (software/hardware) to be investigated by looking at internal logs of the unit.

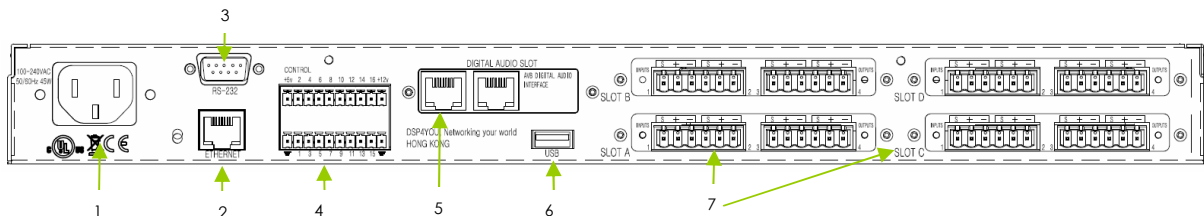
4. **LAN LED** illuminates when connectivity is established on the Ethernet LAN connection. In DHCP mode, LED is on when unit is assigned an IP address by the DHCP server. If no Ethernet cable is connected to the unit, LED is OFF.

5. **DATA LED** blinks to indicate data traffic with the unit using RS232/Telnet or over the web interface. This LED is therefore a handy connectivity indicator when it comes to discovering a specific unit within an equipment rack. (e.g. move a fader and look for a Dana server with a blinking activity light)

6. **D.A.I Status** indicates the status of the Digital Audio Interface (AVB/USB). Illuminated when module connected to network/or PC and in an operating mode.

7. **Power LED** illuminates when AC power is applied to the unit.

1.2 Rear panel description



1. **IEC Power Receptacle:** Flush-mount IEC power receptacle for connecting a compatible IEC power cable (included). Use only the supplied cable or an equivalent International version.

2. **Ethernet LAN** for 10/100Base T network connectivity using a CAT5/6 cable. Required for web configuration and 3rd party TCP/IP control over a secure Telnet session

3. **RS232:** Serial connectivity on DB9 female connector required for 3rd party control with control processors such as Crestron/AMX/Vitty.

4. **GPIO:** General Purpose Input/Output header on Phoenix connector. Allows up to 14 low voltage (5V) and 2 high outputs (12V) for relay trigger.

5. **Digital Audio Interface (DAI):** I/O slot location for Digital Audio Interface. Current options include:

- AVB module for Audio streaming over Ethernet networks
- USB Audio module for multi-channel recording and multi-channel playback

6. **USB host** for configuration backup or USB audio playback from USB key or USB Hard drive.

7. **I/O card slots** for up to 4 Input/Output cards. Refer to the I/O card section for currently available I/O cards.

1.3 Feature description

1.3.1 Digital Signal Processing

Dana Server is fitted with a powerful floating point Digital Signal Processor (DSP) providing the necessary processing for most small to medium installations. Two types of Audio Digital Signal Processors currently exist on the market:

- Fixed DSP architecture where a manufacturer ships a processor with a unique processing signal flow. In 99% of cases, such product bears the limitation of a fixed I/O architecture. Being a simpler product to design for manufacturers, fixed DSP architecture come at a lower cost. The obvious limitation of such device is the fixed DSP configuration of the product which manufacturers typically never modify. As the A/V installation evolves (.e.g. more in/out), experience tells us that fixed DSP with fixed I/O processors do not scale well.
- On the other side of the spectrum, open DSP and flexible I/O architecture processors will provide the extensive programming flexibility that is required for complex, large scale systems. Their ability to scale and fit almost all applications however comes at the detriment of high cost and complex programming skills.

With Dana server, our engineering team designed a product at the crossroads of these 2 types of platforms by providing:

- Flexible I/O configuration thanks to our 4 I/O slots and numerous AVB end points products
- Inter-changeable pre-configured fixed DSP architecture with plug&play configuration allowing simplicity of use and simultaneously providing flexibility for a wide range of applications.

Template algorithms included on Dana servers include: Metering, Automatic Gain Control, Parametric equalizers, true 26 x 24 matrixing, Compressor/Limiter, delay, polarity. For more information about Dana server Audio DSP flow diagram, please consult the plug-in section of the DSP4YOU website.

1.3.2 Audio Video Bridging

AVB defines a group of network protocols for the distribution of time synchronized and low latency Audio & Video streams over IEEE802 networks. By leveraging a combination of existing 802 network technologies along with standards specifically designed for the purpose, AVB technology lays the ground work for un-paralleled guaranteed media streaming over Ethernet networks. The overall concept of AVB is actually rather simple. Without getting into too much detail, the three core protocols specify:

- Timing and synchronization
- Bandwidth allocation through the Stream Reservation Protocol (SRP)
- Traffic shaping to ensure that low priority Ethernet traffic does not interfere with AVB traffic

Engineered from the ground up for media streaming applications, AVB has a definitive edge over legacy Ethernet technology in the sense that it allows bandwidth allocation and priority rules based on timing. Unlike similar audio over IP (AOIP) technology, AVB will dynamically assign and defend bandwidth allocation for AVB streaming thanks to the concept of Stream Reservation Protocol (SRP).

Terminology for AVB streaming goes as follow:

- o **Audio Video Bridging (AVB):** General descriptive for a group of protocols providing audio/ video streaming, timing, synchronization, Quality of service (QoS) , control and discovery.
- o **AVB Endpoint:** AVB powered device, capable of transmitting and/ or receiving audio streams using P1722/ P1733 transport protocol.
- o **Talker:** AVB endpoint transmitting audio to the network. (Source)
- o **Listener:** AVB endpoint receiving audio from the network. (Sink/ Destination)
- o **Talker/Listener:** AVB endpoint that is both transmitting and receiving. All AVB endpoints used on Dana series are by default Talker/Listener devices.
- o **Precision Time Protocol (PTP):** Allows devices on the network to get a notion of global time in the effort to synchronize with each other. PTP component in each AVB module can act as a Grand Master (providing clock) or as a slave (receiving clock). Once a grand master negotiates and is selected as a sync source, all units will synchronize to it.
- o **Streams:** General term describing packetization of one or multiple audio/ video channels over the network. Stream can be unicast or multicast. For the time being, the AVB module only supports unicast streaming. Future revisions will provide additional features.
- o **Stream ID:** Unique 64-bit stream identifier used by AVB transport protocols to identify streams.

1.3.3 Multi-track USB Audio playback/recording

Dana server not only innovates by introducing AVB at the core of our architecture, it also innovates with our multi-channel playback/recording interface. Based on the USB 2.0 protocol, the USB audio card available for the Digital Audio Interface slot can provide 8 channels of recording and 8 channels of playback to a nearby PC/Mac machine. The current maximum specifications for playback/recording are:

- Playback: 48kHz/ 24bit / Up to 8channels
- Recording: 48kHz/ 24bit / Up to 8channels

Refer to the [USB audio card](#) specifications for more information.

1.3.4 Networking at its core

Dana Server leverages a wide range of proven I.T. networking technologies to simplify installation and monitoring of the unit. Here is a quick summary:

- HTML Webserver: No more software, no more cross-compatibility issues. Dana server greatly simplifies your work thanks to its embedded webserver. Its user interface is used for configuration and monitoring of the unit.
- Adobe Flash®: Dana server leverages the latest Web 2.0 Flash technology for a real time user experience unlike any other interface. A web browser (IE/Firefox/Safari/Chrome..) enabled with the Flash® player is all you need.
- ZeroConf: Defines a set of techniques to allow plug&play configuration and discovery of network devices. Forget about static IP, complex network setup techniques. Zeroconf on Dana server allows you to setup a device with "Zero knowledge, zero configuration".
- Bonjour/mDNS: Nowadays widely supported by Apple devices, mDNS fits in the "ZeroConf" philosophy of Dana server by providing the ability to give a name to a device, rather than identified by its IP address. By default enabled on Mac machines, Bonjour requires to be installed on Windows machine. Thanks to the Bonjour protocol, Dana server can receive a hostname and does not require you to remember by its IP address.
- Link Local Addressing (Auto IP): Also part of the ZeroConf philosophy, Link Local Addressing will automatically assign an IP address in the absence of a DHCP server. Link Local Addressing is a handy feature when it comes to a direct connection to the unit without the need of using Static IP addressing on both units.
- DHCP client: Well known to most of you, a network with a DHCP server (most of the time part of the Router) allows automatic assignment of the IP address. Dana server supports DHCP to allow automatic addressing.
- Transport Layer Security (TLS): With today's growing security concern, DSP4YOU leads the way in the market by providing a secure communication link to your Dana server. Thanks to TLS, all messages between your PC and the server are encrypted to provide a secured path for both Ethernet and Internet connectivity.
- Telnet: Provided as a common user console for monitoring of servers, Dana server provides a telnet interface on port 23. The most likely use of this interface is remote control from a 3rd party control processor (AMX/Crestron/Vitty..) over Ethernet networks.
- File Transfer Protocol (FTP): Widely used for the transfer of large files between servers, Dana server is fitted with a FTP server for the backup/upload of files such as audio files/firmware files.

1.3.5 USB audio music playback

With Linux at its core, Dana server is much more than a simple Digital Audio Signal Processing unit (DSP). Thanks to the USB Audio playback feature, Dana server can easily turn into a Background Music Processor. Current supported files include MP3 audio files located in the root folder of an External USB hard driver or USB key plugged into the rear USB port.

2 Setup guide

2.1 Dana box content and mounting instructions

Box Content

- Dana server loaded with I/O cards as per your purchase order
- Rack ears for rack mounting
- IEC power cable
- 2m Straight-through Shielded CAT-6 patch cable
- Step-by-step startup guide
- Phoenix style terminal plug-in terminal blocks

Mounting instructions

Dana unit ships with removable rack ears allowing rack mounting or shelf installation. Remove the 4 x M3 screws to modify the configuration of your unit from shelf to rack configuration.

2.2 Connectivity

2.2.1 Network

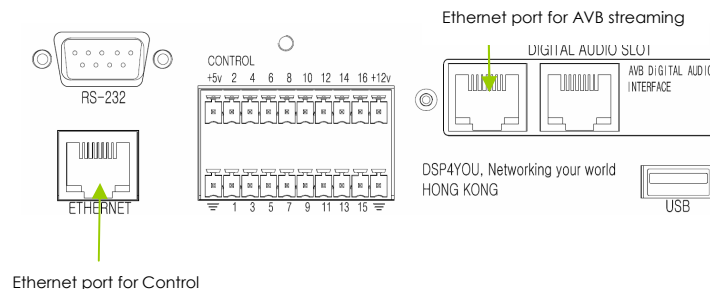
Dana requires Ethernet connectivity for configuration through its embedded web-based user interface:

- A standard-straight through Ethernet CAT5/6 network is required for connectivity through a network switch.
- A crossover CAT-5/6 cable is required for direct connectivity to a PC/Mac machine that doesn't support auto-switching.

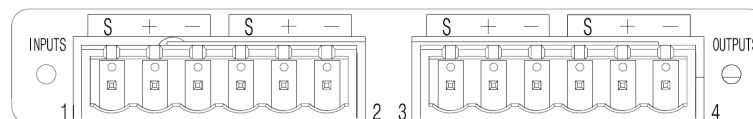
Depending on the Dana server hardware configuration, two types of network ports may be provided:

- 1x Ethernet port to be used for control over the web based user interface. This port requires a simple 10/100MB connection to a network switch or directly to a PC.
- If the Digital Audio Slot is fitted with the AVB interface, 2 x RJ-45 connectors provide a redundant audio streaming interface. If redundancy isn't required a single Ethernet connection to a network switch is sufficient. AVB requires at minimum 100MB connectivity.

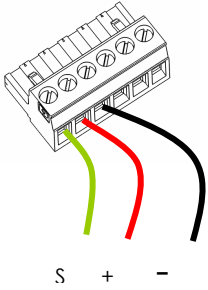
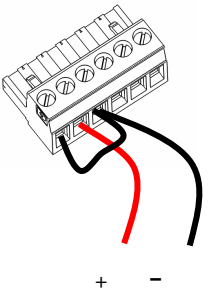
Note that both network connections can co-exist on the same network/ switch without any issues. Please consult the [minimum system requirements](#) section for more information.



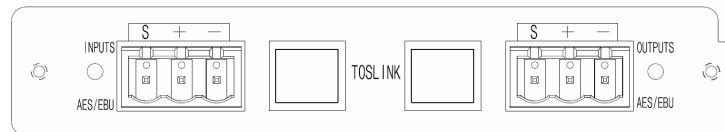
2.2.2 Analog audio I/O card



Dana Server can accept Balanced and Unbalanced audio inputs/ outputs. See the instructions below for audio connectivity:

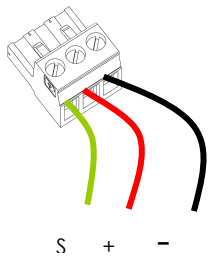
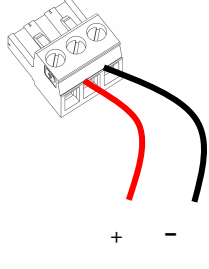
Balanced connection	Un-balanced audio
S => Cable Shield + => Positive cable - => Return cable	S => Jumper link to - + => Positive cable - => Return cable (jumper to shield)
	

2.2.3 Digital Audio I/O card



Dana Server accepts Balanced (AES/EBU) and Unbalanced (SPDIF) digital audio as well as Fiber (toslink) connectivity. See the following instructions for the correct pin out.

Note that the Asynchronous Sample Rate Converter (ASRC) allows a wide range of digital input sample rate from 8kHz-192kHz. The digital output sample rate will be synchronized to the Digital Signal Processor sampling rate.

AES/EBU mode	SPDIF mode	Toslink
S => Cable Shield + => Positive cable - => Return cable	+ => Positive cable - => Return cable	One toslink receiver connected to the digital audio source. One toslink transmitter connected to the digital audio destination
		Toslink fiber cable

2.2.4 Serial port (RS232)

1 x RS232 port allows connectivity to an external control processors (e.g. Crestron, AMX, Vitty..). An RS232 null modem cable is required for connection to a PC. Pin out for the Dana RS232 connector is as follow:

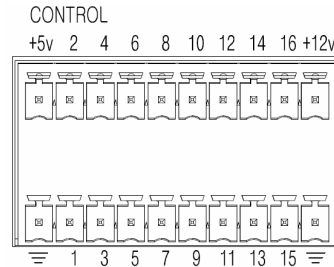
Pin2: Transmit (TX)
 Pin3: Receive (RX)
 Pin5: Ground (GND)

Note: Dana server RS232 port does not handle hardware handshaking and therefore CTS/RTS pin are not required.

2.2.5 GPIO

Up to 14 x GPIO and 2 relay outputs are provided for external interfacing.

- GPIO 1 to 14 will connect between +5V and ground. In an input configuration, they can be connected to a contact closure. In an output configuration, they are able to drive an LED (max 7mA) without the need of an external power supply.
- Relay output 15/16 are to be used for relay outputs and can sink up to 500mA.



2.2.6 AC power connection

Dana requires a stable 90 to 240V, 50-60Hz AC supply. UPS protected systems will insure higher reliability in installations where power quality is unknown. Plug the provided AC power cable to the IEC receptacle.

2.3 System setup requirements

2.3.1 PC / Mac / Linux systems

Dana Server requires an initial configuration to operate correctly. Thanks to its web-based interface powered by Flash technology, Dana server is cross-platform compatible for PC/MAC/Linux system:

- CPU 1GHz or higher
- 128MB video card
- RS232 port or USB-RS232 adapter
- Internet browser: IE/Safari/Firefox/Chrome
- Latest version of Adobe Flash web plug-in from Adobe.com website : <http://get.adobe.com/flashplayer/>
- Latest version of Bonjour protocol if using Windows platforms: <http://support.apple.com/kb/DL999>
- Keyboard & Mouse

2.3.2 Control Network minimum requirements

Dana requires at the minimum a 100BaseT Ethernet network for configuration and monitoring. Internet connectivity may be provided to allow remote monitoring over Internet. See the port forwarding section in the configuration section for more information.

Dana server supports 2 modes of IP addressing:

- Automatic with DHCP or Link Local Addressing mode (Auto IP). This is the default mode.
- Static IP addressing (only recommended for users knowledgeable enough to setup a network)

2.4 Step by Step setup guide

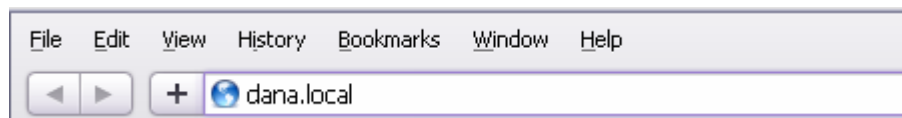
The following instructions are a high level summary of the basic steps required to configure a single Dana server. These instructions should be read along with the configuration section of this manual.



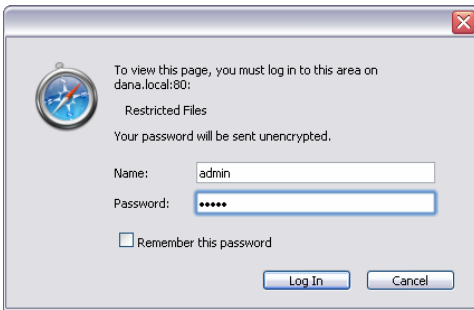
Important note: All units will ship in DHCP/Auto IP mode and configured with the hostname `danal.local`. When configuring multiple Dana Servers on one network, make sure to configure each unit with a unique hostname as a first step. If using Static IP addressing, also remember to modify the default IP to prevent an IP conflict.

Step 1: Following the connectivity instruction the previous section, power on the unit. Power LED of the front panel will light up. The bootstrap sequence is about 20second long.

Step 2: Once the *System & Network Status* Led illuminate, the unit is ready for control. We can now connect to the unit using the Internet Browser of your choice (IE/Firefox/Chrome/Safari/). Simply type into the address bar of the browser "`danal.local`" as shown in below picture.



Step3: A prompt appears for a secure login to the Dana web interface over the TLS protocol (Secure connection).
The default account credentials are:



A login dialog box with a title bar containing a close button. Inside, there's a compass icon and text: "To view this page, you must log in to this area on dana.local:80: Restricted Files. Your password will be sent unencrypted." Below this are input fields for "Name:" (containing "admin") and "Password:" (containing "*****"). A checkbox labeled "Remember this password" is unchecked. At the bottom are "Log In" and "Cancel" buttons.

User name: admin
Password: admin

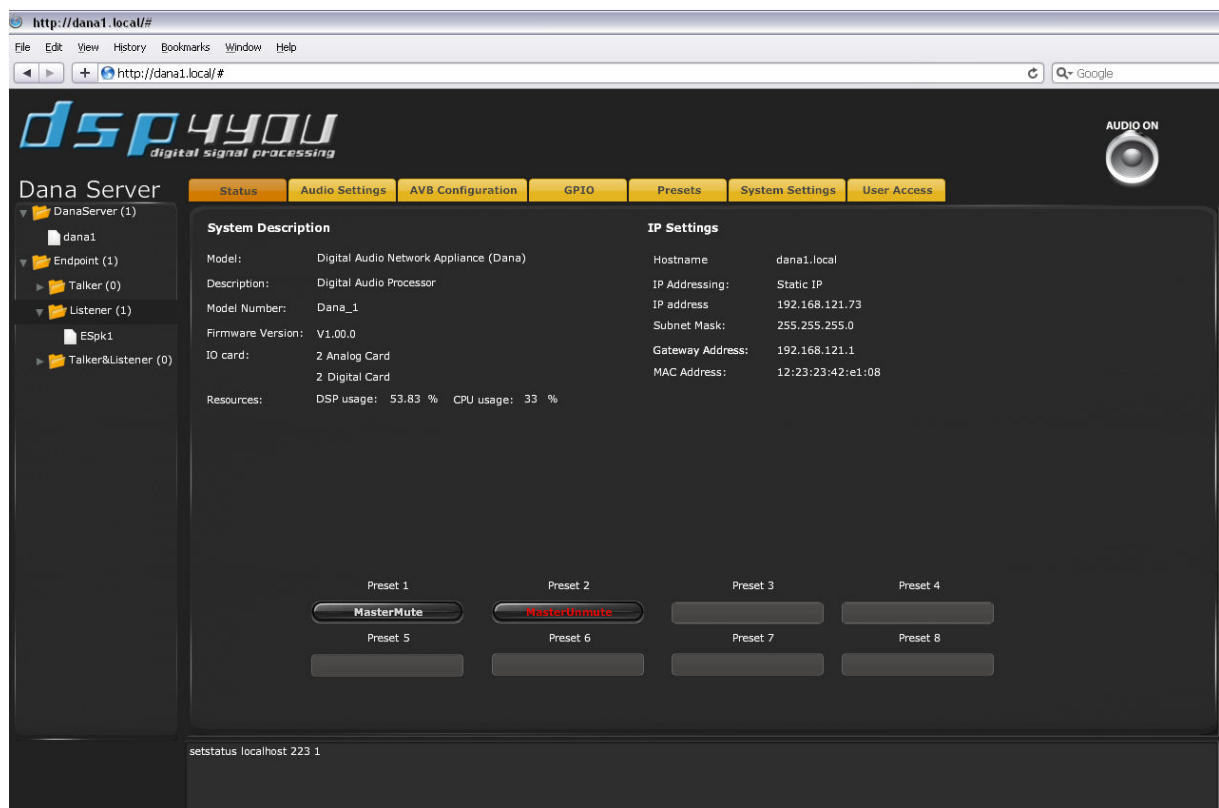
Step4: Once logged into the user interface, you can now navigate the tabbed interface to configure the unit as required. You are now live and all settings are automatically applied to the unit real time.

3 System Configuration

3.1 Web interface overview

Dana server web interface allows intuitive control without the typical learning curve of complex software. With the help of Web 2.0 technology, Dana server provides a real time and dynamic web interface unlike anything you've seen before. While the DSP configuration depends on the firmware version loaded in the unit, the core structure of the User interface consists of the following core sections:

- A Device tree on the left side lists all discovered Dana devices on the network (server + AVB end points)
- A center section tabbed based structure allows access to the various sections of the user interface



The screenshot shows a web browser window at <http://dana1.local/#>. The interface features the DSP4YOU logo and a navigation bar with tabs: Status, Audio Settings, AVB Configuration, GPIO, Presets, System Settings, and User Access. On the left is a device tree showing "DanaServer (1)" with sub-items "dana1", "Endpoint (1)", "Talker (0)", "Listener (1)", "ESpK1", and "Talker&Listener (0)". The main content area is divided into "System Description" and "IP Settings".

System Description		IP Settings	
Model:	Digital Audio Network Appliance (Dana)	Hostname	dana1.local
Description:	Digital Audio Processor	IP Addressing:	Static IP
Model Number:	Dana_1	IP address	192.168.121.73
Firmware Version:	V1.00.0	Subnet Mask:	255.255.255.0
IO card:	2 Analog Card 2 Digital Card	Gateway Address:	192.168.121.1
Resources:	DSP usage: 53.83 % CPU usage: 33 %	MAC Address:	12:23:23:42:e1:08

Below the settings are eight preset buttons labeled Preset 1 through Preset 8. Preset 1 is "MasterMute", Preset 2 is "MasterUnmute" (highlighted in red), and the others are empty. At the bottom, a status bar shows "setstatus localhost 223 1".

Tabbed Structure

- **Status:** Provides overall view of the current settings of Dana server including the model number, firmware version, loaded I/O cards, DSP & CPU usage, IP settings. The bottom side of the page also includes up to 8 button shortcuts which can be assigned to a preset.
- **Audio settings:** Digital Signal Processing section of the interface. Provides control to all DSP algorithms running on the floating point Sharc DSP. Note that this section is flexible with the choice of plug-ins and loaded I/O cards.
- **AVB Configuration:** This section allows configuration of AVB streams on the network. Using a simple drag and drop interface, one can easily configure streams between AVB end points.
- **GPIO:** Section providing control of the General Purpose Input Output interface.
- **Presets:** Section for the programming of preset configuration of the Audio setting section (DSP)
- **System settings:** Section for the general configuration of the Dana server (e.g. RS232/time&date/IP/firmware upgrade...)
- **User Access:** Section for configuration of the user accounts.

3.2 Dana Server configuration

3.2.1 Audio settings

The audio settings page consists of 2 sections:

- A monitoring section allowing metering of audio signals on the card slots as well as audio signals on the Digital Audio Interface (DAI) such as the AVB signal or USB audio signals.
- A center section allowing control of the various algorithms of the fixed architecture DSP.

See below one template plug-in configuration currently available on the Dana series.



The following sections will describe the configuration panel for each processing block.

3.2.1.1 Slot control

Depending on the loaded card in the slot, the user interface will automatically load the correct user interface for the slot. With two types of I/O cards currently available (analog or digital), the following interfaces are available:

➤ Analog input / output configuration panels

The image shows two side-by-side screenshots of the Slot A control interface. The left panel is titled 'Slot A - Analog Input Control' and the right panel is titled 'Slot A - Analog Output Control'. Both panels have two columns for Channel 1 and Channel 2. Each channel has a vertical RMS meter with a color scale from -60 dB (green) to 24 dB (red). Below the meter is a digital gain slider from -60 to +24 dB. Further down is an analog trim control (0 to 60 dB in 6 dB steps) and a digital mute button. The bottom section includes phantom power (+48V), polarity reversal checkboxes, and a custom text label field.

Annotations for Slot A - Analog Input Control:

- Digital Gain (-60 to +24dB) points to the gain slider.
- RMS meter points to the vertical level indicator.
- Analog trim (0 to 60dB in 6dB steps) points to the trim control.
- Digital Mute points to the Mute button.
- Phantom Power (+48V) points to the P.Power button.
- Polarity reversal points to the Polarity checkbox.
- Custom text label points to the a-ch1 field.

Annotations for Slot A - Analog Output Control:

- Output RMS meter points to the vertical level indicator.
- Digital output attenuation points to the digital gain slider.
- Analog mute (post DAC) points to the Mute button.
- Analog PAD (-14dB) for Pro/consumer output level points to the Attenuation dropdown (set to -14 dBu).
- Polarity reversal points to the Polarity checkbox.
- Custom output label points to the a-ch2 field.

➤ Digital AES/EBU – SPDIF/Toslink interface configuration panels

The image shows two side-by-side screenshots of the Slot B control interface. The left panel is titled 'Slot B - Digital Input Control' and the right panel is titled 'Slot B - Digital Output Control'. Both panels have a dropdown menu at the top for selecting the input/output source (AES/EBU, SPDIF, Optical). Below this is a vertical RMS meter with a color scale from -60 dB (green) to 24 dB (red). Further down is a digital gain slider from -60 to +24 dB. Below the slider is a digital mute button and a polarity reversal checkbox. The bottom section includes a custom text label field.

Annotations for Slot B - Digital Input Control:

- Selection of input source points to the AES/EBU dropdown menu.
- Digital Gain (-60 to +24dB) points to the gain slider.
- RMS meter points to the vertical level indicator.
- Digital Mute points to the Mute button.
- Polarity reversal points to the Polarity checkbox.
- Custom text label points to the b-ch1 field.

Annotations for Slot B - Digital Output Control:

- Selection of output impedance (AES/EBU) or SPDIF for the terminal block connector points to the SPDIF dropdown menu.
- Custom text label points to the b-ch2 field.

3.2.1.2 USB Audio input

For applications requiring playback of MP3 music files from a USB key or USB hard drive, Dana server provides the ability to read such file in loop mode. The perfect fit for a background music processor application.

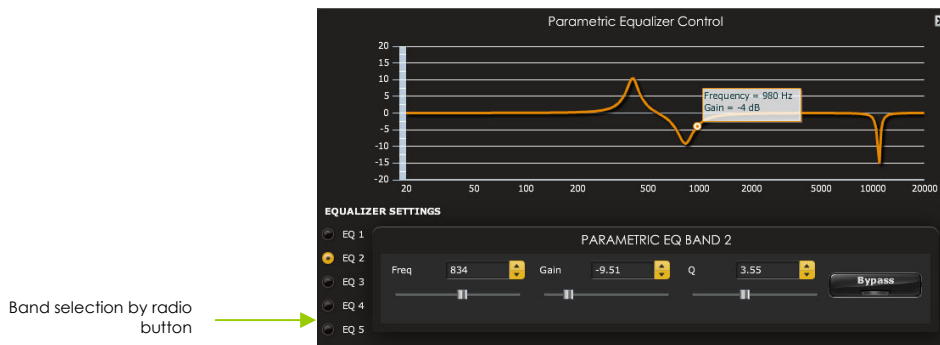


3.2.1.3 Parametric

Up to 5 bands of PEQ on each input/output section is available. For each band, the typical PEQ settings go as follow:

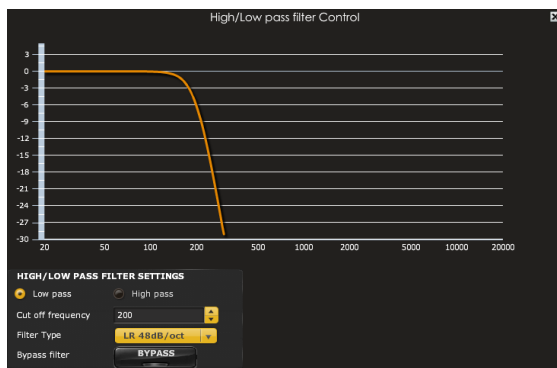
- Frequency (Freq): Using the slider or text box, enter the center frequency of the PEQ filter
- Gain: controls the boost or dip of the equalizer
- Q: Controls the number of octaves over which the filter affects the signal.
- Bypass: Control on a per band basis whether the PEQ is enabled or not.

At any times during the tuning, one can easily mouse over the curve to provide a real time reading of the value.

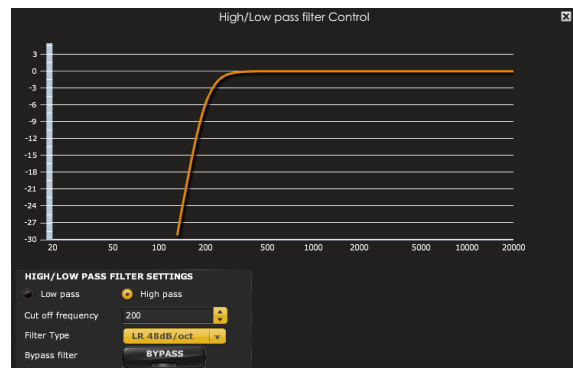


3.2.1.4 Filter Control

On some plug-ins, the DSP configuration may be fitted with filter block. This block can either be configured as a Low pass or High pass filter for Butterworth, Linkwitz Riley filters up to 48dB/oct. Use the radio button to toggle between Low and High pass mode.



Low Pass filter mode



High Pass filter mode

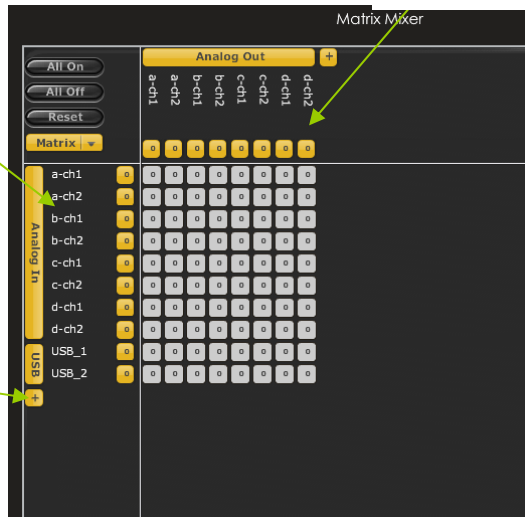
3.2.1.5 Matrix mixer

Data server ships with a full matrix mixer allowing up to 26 in by 24 out complete with input/output label automatically tracking the custom label entered on the input/output slots.

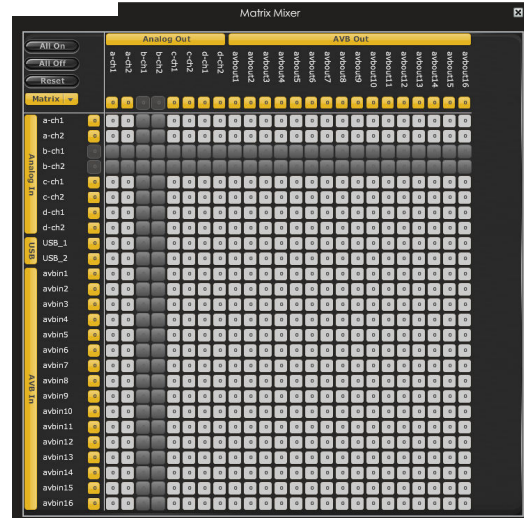
Custom labels from Output slots
automatically tracks to the mixer

Custom labels from Input
slots automatically tracks
to the mixer

Click on "+" to expand
the Matrix



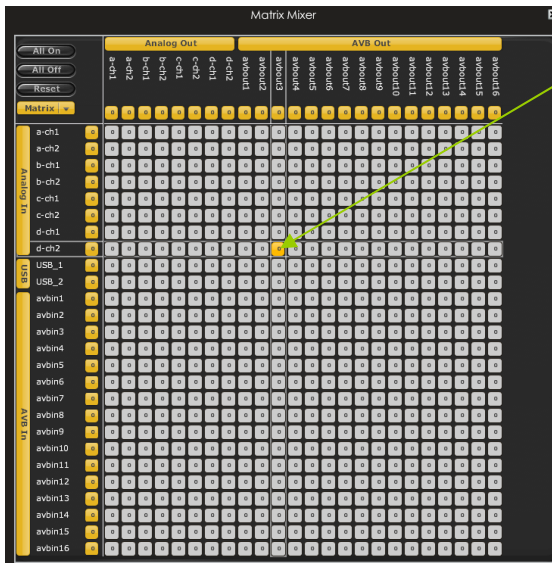
Matrix mixer in reduced size



Matrix mixer in expanded mode

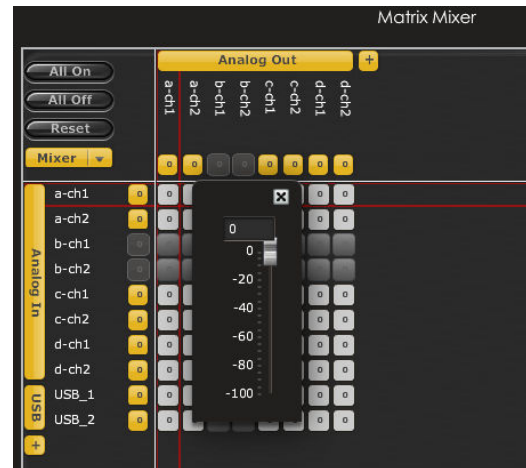
Two modes of operations are available:

- Matrix mode: Toggles the cross point from ON to OFF with a simple click of a mouse. A grey highlight of the active row and columns guides the selection.
- Mixer mode: Controls the level at the cross point for the mixing part of the "Matrix Mixer". A red highlight of the active row and column guides the selection.



Matrix Mode – Single click toggles crosspoint

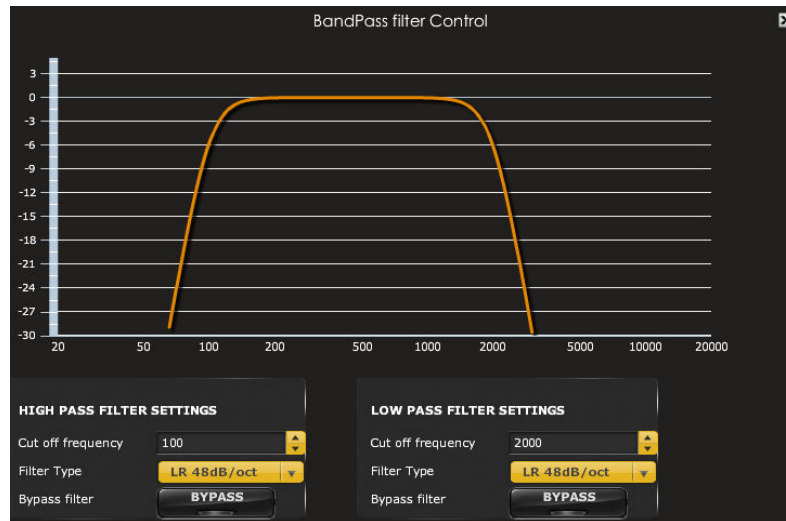
One click toggles on/off crosspoint



Mixer Mode – Single click opens up gain control

3.2.1.6 Bandpass filter

At the output of the matrix mixer, a bandpass filter made up of 1 x Low pass filter and 1 x high pass filter provides all the flexibility required for multi-way speaker processing applications.



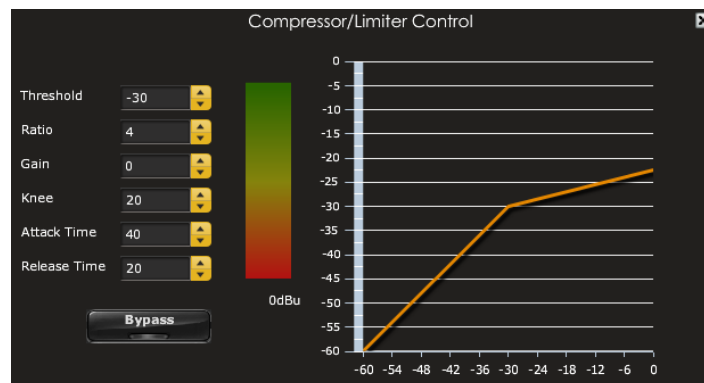
Filter type provided include:

- o Butterworth (BW): 6/12/18/24/30/36/42/48dB
- o Linkwitz Riley (LR): 12/24/36/48dB

3.2.1.7 Compressor/Limiter

The control panel for the compressor limiter provides all the typical control settings including:

- o Threshold: 0 to -60dB in 0.1dB increments
- o Ratio: 1 to 50 in 0.1dB increments
- o Gain: 0 to 24dB in 0.1dB increments
- o Knee: 1 to 60 in 0.1dB increments
- o Attack time: 20 to 100ms in 0.1ms increments
- o Release time: 20 to 100ms in 0.1ms increments
- o Bypass: Bypass all compression/limiting on the path



3.2.1.8 Delay

The delay block provide time alignment for up to 3000ms (3s). Both distance and time are provided for convenience sake.



3.2.2 AVB Configuration

The AVB configuration step consists in building the streams between a talker and listener. In Dana server, the AVB configuration tab can configure streams for any AVB enabled device on the network (Server or AVB end points).

The hostname is linked to the server hostname and can only be changed from the system settings tab.

Unlike similar Audio over IP (AOIP) technology using fixed "bundle" size, Dana server is very flexible on the channel assignment to be combined into the AVB "stream". Current specifications of Dana server AVB interface are as follow:

- Up to 16 audio channels in, up to 16 audio channels out
- Up to 6 streams in, up to 6 streams out

Future versions of the platform/firmware will expand the specification of the platform.

The Dana server AVB configuration requires limited setup. The following section will highlight steps involved in building/deleting an AVB stream. Please refer to the [AVB primer](#) for the basic terminology used through out this section.

3.2.2.1 Build a Stream

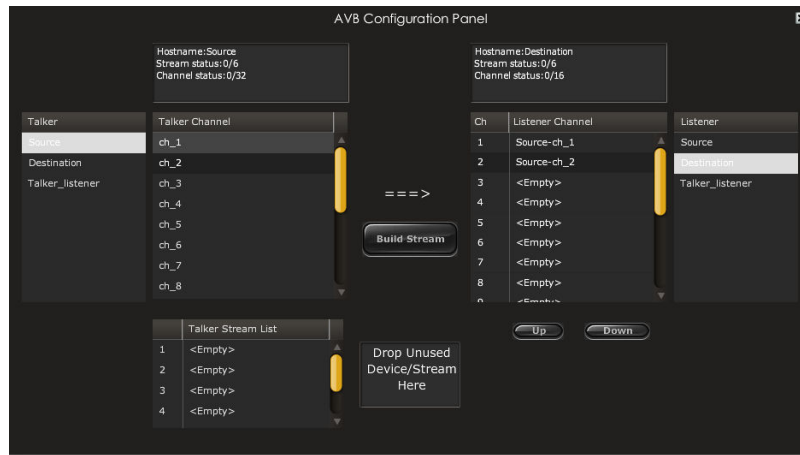
Click on the **"Configure AVB Stream"** button to access the following dialog box.

To select one Talker for configuration, drag & drop action as shown by green arrow

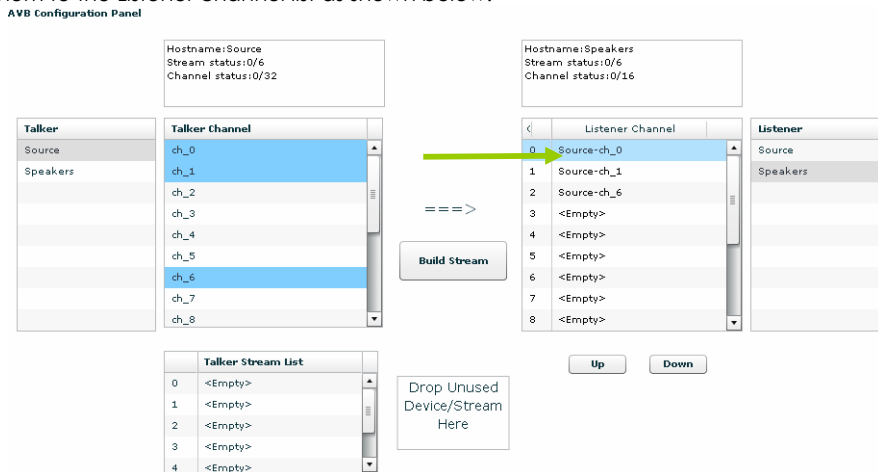
To select one listener for configuration, drag & drop action as shown by green arrow

2 simple sections: Talkers (source) on the left, Listeners (destination) on the right.

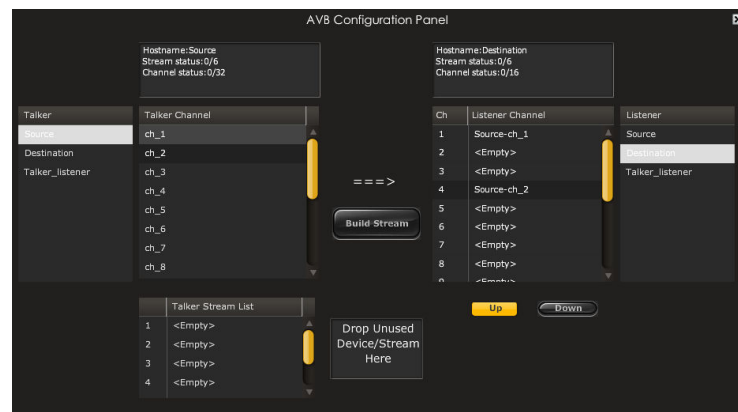
Select one Talker (i.e. Source) from the Talker list and drag&drop it in the **"Drop Talker Here"** box. Repeat the same step for the Listener side (i.e. destination). The dialog box should now look like this:



With the talker and listener selected, the next step in building a stream is to select the source channels from the talker channel section. You can select one or multiple audio channels (press the CTRL key) from the Talker list. Simply 'drag&drop' them to the Listener channel list as shown below:



Although the user interface will automatically pack up the talker channel in consecutive order on the listener side, audio channels can be re-arranged. Using the Up & Down buttons, one can re-organize the order of channels on the listener side as shown below.

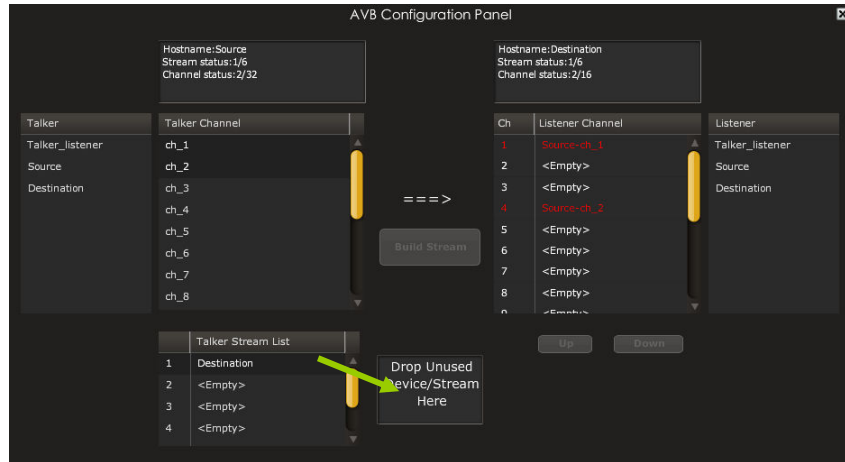


Once a stream is configured, simply click the "Build Stream" button at the center of the dialog box. If successful, a dialog box will acknowledge the stream configuration with the stream ID.

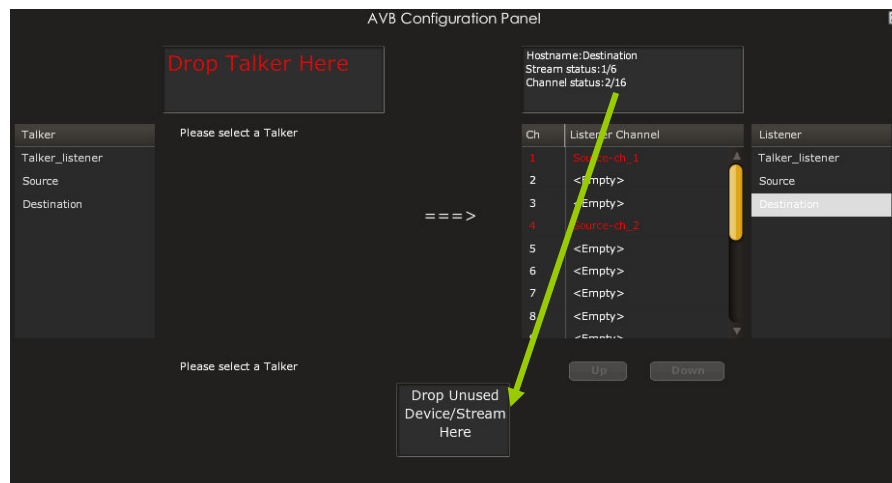
3.2.2.2 Delete a stream

Once a stream is configured, the stream is listed in the Talker stream list (below the Talker audio channels), and is uniquely identified by the Listener's hostname. To delete a stream, simply drag from the Talker stream list the particular stream into the garbage bin.

To delete a stream, simply drag the stream into the garbage bin as shown by green arrow



To configure a new stream with a new device, simply drag the Talker/ Listener into the garbage bin.



3.2.3 GPIO programming

The GPIO tab allows for programming of the configuration of the General Purpose Input/outputs (GPIO). The current plug-in only enables the recall of a pre-built preset on the trigger of a contact closure (Input type). Future versions of the firmware will allow additional features.

STEP1: Select the GPIO for configuration by clicking on one of the 16 GPIO.

STEP2: Select the type of GPIO

STEP3: Select from the drop down menu the preset to be recalled on high/low state

STEP4: Click **Save** button to finalize the configuration.

3.2.4 Preset Building

The Dana server provides a flexible yet simple user interface for the configuration of presets. The default dialog box show below lists all presets currently configured.

Red highlighted text indicates the last recalled preset.

Click the **New** button to create a new preset.

Click the **Recall** button to enable the Preset

3.2.4.1 Building a new preset

Preset building under Dana can be of two types:

- o Block mode: Saves all the settings of a specific set of blocks.
- o Command mode: Provides the ability to save a string of custom Open Control Commands (OCP) to allow more customized, finer preset programming.

Block mode preset configuration:

Enter the preset label here

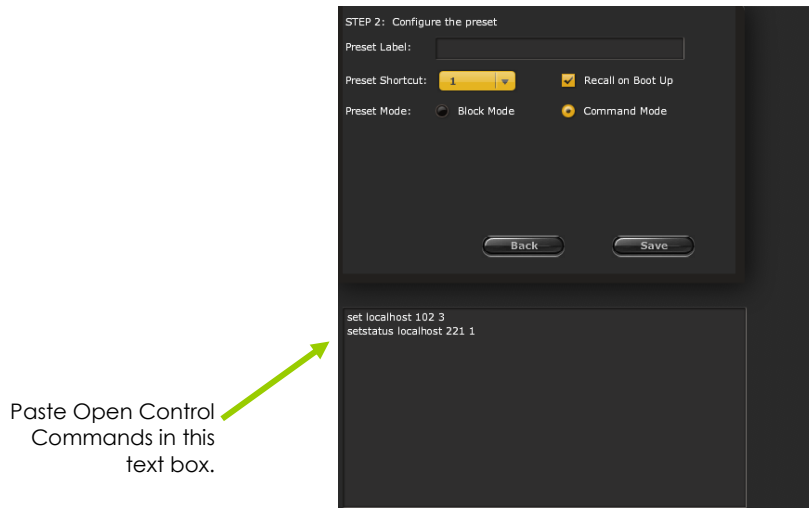
The preset shortcut allows you to assign a preset to one of the 8 buttons on the home page.

Enable this button if you'd like the preset to be recalled on power up.

Tick box next to the block to save the block settings as part of this preset.

Command mode preset configuration:

The dialog box present the same basic configuration at the exception of the bottom part where users can now paste their custom Open Control Command strings to modify the setting of a specific DSP object of the Dana server.

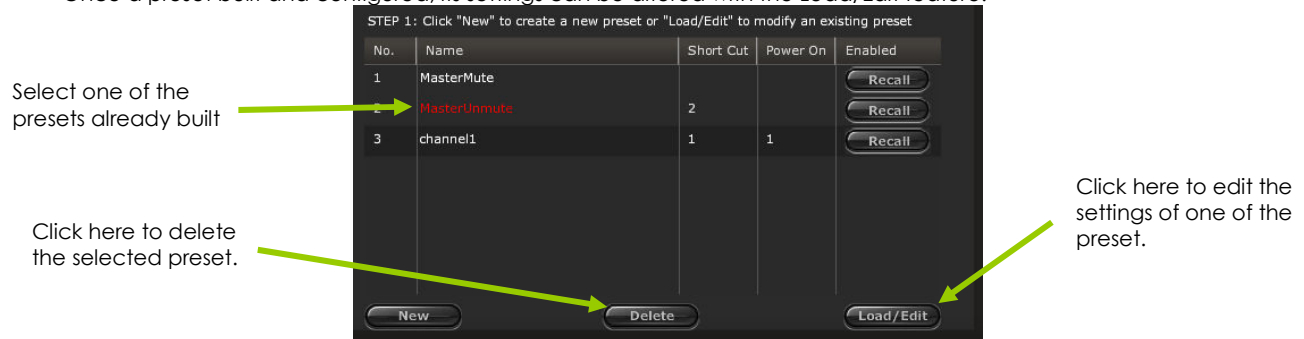


Note: Please consult the [Open Control Command](#) section of this user manual for more information about building the correct commands to control a specific block.

Once the preset configured, click the **Save** button to finalize the configuration.

3.2.4.2 Load/Edit or Delete a preset

Once a preset built and configured, its settings can be altered with the Load/Edit feature.



3.2.5 System settings

3.2.5.1 Basic settings

The Basic settings tab allows configuration of:

- Baudrate of the RS232 port: 9600 / 38400 / 115200
- Date: Click on the calendar to set the embedded Real Time Clock (RTC)
- Time: Set the hour and time of the device.

The screenshot shows the Dana system settings interface. The top navigation bar includes tabs for Status, Audio Settings, AVB Configuration, GPIO, Presets, System Settings, and User Access. The 'System Settings' tab is selected, and the 'Basic Settings' sub-tab is active. The 'Basic Settings' section contains fields for Baudrate (set to 38400), Date (set to 12/10/2010), and Time (set to 18:10). A 'Save' button is located to the right of the time fields. Below the 'Basic Settings' section, there are three sub-tabs: 'I.P Settings', 'System Backup/Recovery', and 'Firmware Upgrade'. The 'System Log' section at the bottom displays a list of system events, including system starts and IP address changes.

3.2.5.2 I.P settings

This section of the system settings panel allows configuration of:

- Dana server hostname: A unique name which will conveniently allow
- IP addressing modes
 - Static IP for configurations requiring a static IP . Note, this configuration is not recommended unless you know what you are doing. Improper configuration could prevent you from accessing the unit.
 - Automatic/DHCP mode for plug&play configuration

The screenshot shows the 'I.P Settings' sub-tab within the 'System Settings' panel. The 'Hostname' field is set to 'dana1'. The 'IP Addressing mode' section has two radio buttons: 'Static IP' (selected) and 'DHCP'. Below this, the IP address is configured as 192.168.121.73, the Subnet Mask as 255.255.255.0, and the Gateway as 192.168.121.1. A 'Save' button is located at the bottom right of the configuration fields. Below the 'I.P Settings' section, there are two sub-tabs: 'System Backup/Recovery' and 'Firmware Upgrade'.

3.2.5.3 System /

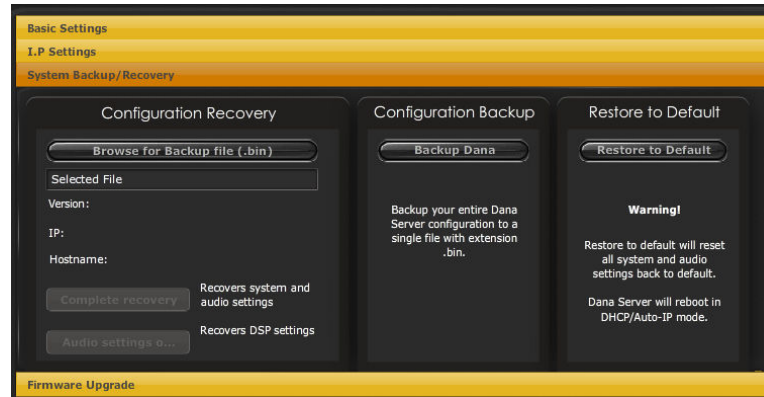
Backup

Recovery

To simplify system configuration of similar systems and/or allow rapid replacement of an existing system, Dana server is fitted with the following system backup/recovery.

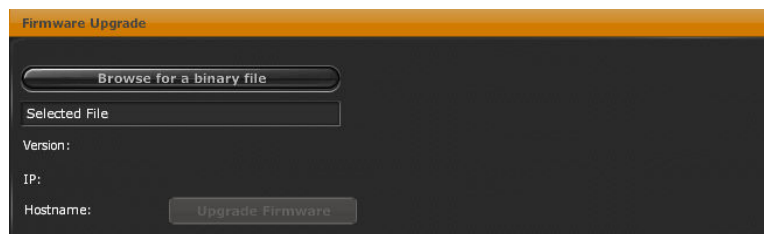
- Configuration recovery allows you to browse on your PC for a binary file (.bin extension). Once selected, the file is automatically uploaded by FTP to the server. Note that the configured IP address and hostname is displayed for reference. If different from the current setting, make sure to pay attention else you will not be able to access the unit at power cycle.
- Configuration backup allows you to backup your entire Dana server configuration including audio, system, user settings, presets and even system logs.
- Restore to default if you ever want to restore the unit back to default.

Warning: Pressing restore to default will clear all your system settings, presets and audio settings.



3.2.5.4 Firmware Upgrade

The firmware upgrade step dialog box is as shown below. Click on Browse for a binary file to locate the .bin file you downloaded from our website.



3.2.5.5 System Logs

Data server provides a system log showing a list of last major events. Current logged events include:

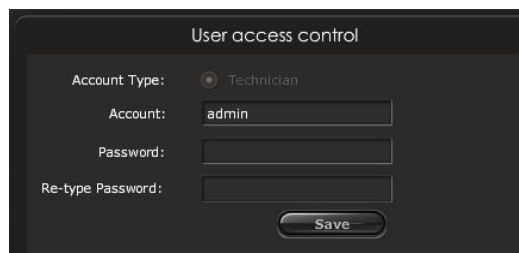
- System boot up (handy at troubleshooting potential power down of the unit)
- IP addressing (handy at troubleshooting potential IP change on the network)



Future logging event to be included in future versions of the firmware.

3.2.6 User access

Data server offers a secure login interface (TLS) to the webserver with a default username (admin) and password (admin). We strongly recommend that you modify the user name/password



3.3 AVB End point

Dana server not only provides configuration and monitoring configuration of any device from the Dana series currently connected on the network. By clicking on the device tree on the left, one can access and configure any device from the Dana series. The following section will describe the configuration and control of Dana series AVB end points.

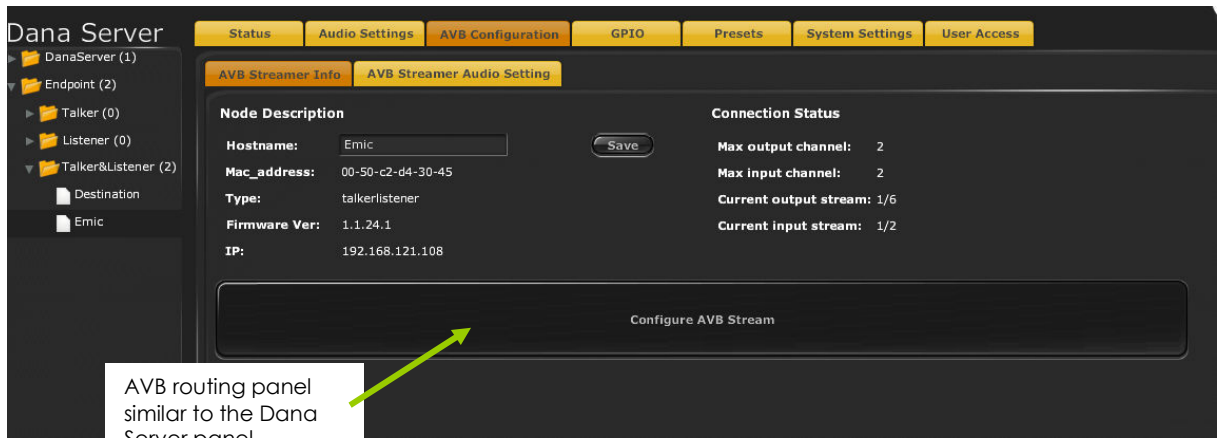
3.3.1 E-line/E-power configuration panel

From the Device tree, AVB endpoints are automatically advertised and available for configuration without the need of any configuration. For easy identification, the default hostname of the Emic module is its Mac Address. One can easily modify the hostname from the "AVB Streamer" info tab.

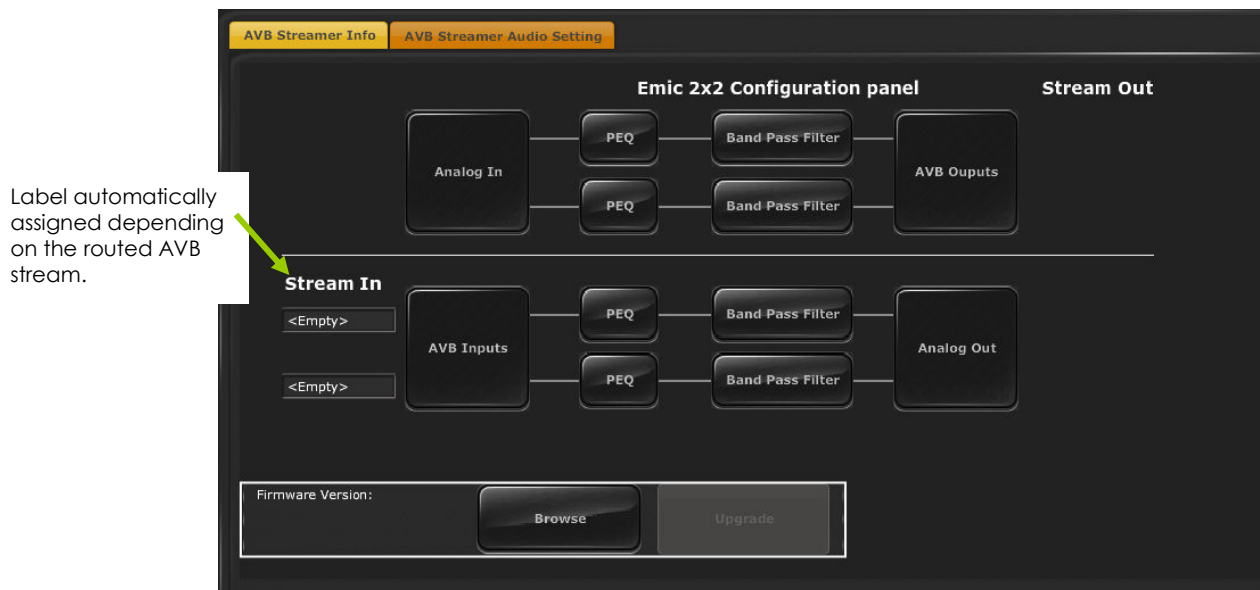
The status page provides general information such as the loaded firmware, maximum input and output channels.

configuration

a User interface for the of the Server, but it also allows



The AVB Streamer audio setting provides access to the de-centralized Digital Signal Processing available on the AVB End point. The optional DSP feature may or may not be available depending if the AVB End point was purchased with a DSP plug-in license. Note that all AVB End point are provided on board local Digital Signal Processing meaning that the optional DSP feature can be enabled at a later time. Contact our [sales team](#) for more information.



For more information about the configuration of the AVB end points (E-line/Epower), please consult their respective user manuals.

3.4 Remote networking configuration

3.4.1 Firewall configuration

Some corporate networks may require a specific firewall setting to enable access of the unit across subnets. Here is a summary of the ports being used on Dana server:

- Port 80 – TCP/IP
- Port 2009 – TCP/IP
- Port 843 – TCP/IP
- Port 23 - Telnet

3.4.2 Port forwarding

Dana server fully supports port forwarding, i.e. the ability to control the device over the internet with minimal configuration and no VPN requirements.

To enable port forwarding on Dana and control from the Web interface, 3 ports needs to be forwarded (80/2009/843) such that any access from the WAN will be re-directed to the Dana server. We recommend setting up Dana to static IP address to insure the server IP address does not change.

While every Router interface is different, here is a typical interface for a Dana server with a local IP 192.168.121.73.

Port Forwarding / Port Triggering

Please select the service type

- ☒ Port Forwarding
☐ Port Triggering

Server IP Address

192 . 168 . 121 .

	#	Service Name	Start Port	End Port	Server IP Address
☐	1	Dana1	2009	2009	192.168.121.73
☐	2	Dana2	843	843	192.168.121.73
☐	3	Dana3	80	80	192.168.121.73

Template Router configuration for Dana Server port forwarding

Note that you will need the Public IP provided by your Internet provider (on the Dana side) in order to access the Dana server. Services of Dynamic DNS such as "DynDNS.org" can provide a free DNS name for your router and allow you to access the unit remotely without knowing its IP address.

Note that port forwarding is a very common networking feature of the I.T industry that is very well documented online. We therefore recommend that you perform a bit of research to know the basics of port forwarding setup if you feel this section didn't provide the information you needed.

4 Open Control Protocol (OCP) for 3rd party control

4.1 General description

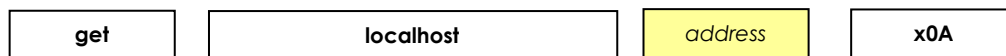
Dana server supports a comprehensive 3rd party protocol (OCP) over RS232 or TCP/IP interface for control by a 3rd party control processor (AMX/ Crestron/ Vity/ PC...). The ASCII based Open Control Protocol (OCP) has the following basic rules:

- OCP is case sensitive
- Each OCP command consists of an ASCII command string terminated by a line feed (0A in Hex)
- Each OCP reply consists of an ASCII reply string followed by a carriage return + a line feed (x0Dx0A in Hex)
- To simplify system programming of Dana server, no lengthy or complex user manual is required. Simply log-in to the Web user interface and look at the bottom section of

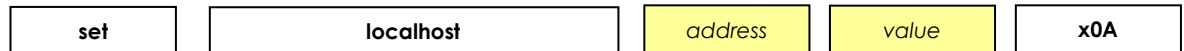
4.1.1 Commands strings

Command strings from a 3rd party processor (e.g. Crestron/AMX/Vity) to a dana server can be of three types:

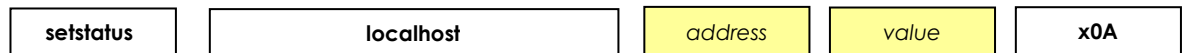
- Command string to "GET" the status of a block



- Command string to "SET" the status of a block



- Command string to modify the status of a block with "SETSTATUS"



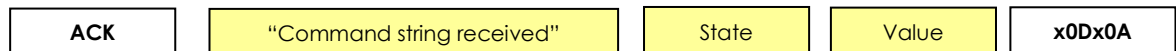
In this case, value can range from 1 to 3:

- 1 = mute state
- 2 = active state
- 3 = bypass state

4.1.2 Reply string

To provide full monitoring of the structure, dana server provides a comprehensive reply to each command string issued by the 3rd party control processor. Two types of reply string can be summarized as follow:

- If the command string was successfully processed by the server, the following string will be output as a reply:

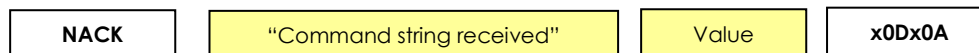


ACK: String of acknowledgement by the server

State: Three potential arguments

- active: 1
- bypass: 2
- mute: 3

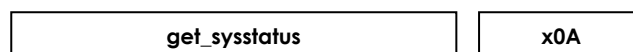
- If the command string was unsuccessfully processed by the server, the following string reply will be given:



4.2 Recovery of IP address and hostname

In the unlikely event that you would have lost the hostname and IP address of the unit, the RS232 port is the only interface able to troubleshoot the device.

Please refer to the Serial port connectivity for more information about the requirements.



5 Technical specifications

5.1 Dana Server specifications

Feature	Description
Digital Signal Processor	32bit floating point, Sharc Core, 1600MFLOPS peak
Host Processor	400MHz CPU running custom Linux kernel
Storage	On- board 2Gb SD card supports storage of configuration for in-field replacement. External USB slot allows connection to USB key or external hard drive for audio loop playback of MP3 files
Sample rate	48kHz or 96kHz depending on plug-in selected
Card slots	4 x configurable slots provide flexible Input/Output configuration for analog & digital audio cards. See table below
Optional Ethernet AVB interface	Optional Ethernet AVB module provides 16 channels IN, 16 channels OUT, synchronized and low latency Maximum cable length 100m/300ft and up to 7 Ethernet switch hops on CAT5/6/7
Optional USB interface	Asynchronous USB interface, Windows/Mac compatible Up to 8 x channels of Audio recording, 24bits/48kHz Up to 8 x channels of Audio playback, 24bits/48kHz
Rear panel connectors	Ethernet control: RJ-45, 100Mbps Ethernet AVB (Optional): RJ-45, 100Mbps RS-232 serial: Female DB-9 connector for full duplex communication 16 GPIO connector for recall of preset, remote trigger from Dana USB host: allow for backup/restore of configuration, USB audio playback in loop for Background music processor
Front panel indicators	I/O card LEDs: Per channel signal and clip LED Others: System, LAN, Data activity, D.A.I slot status, Power LED indicators
GPIO connector	Up to 14 x configurable control inputs: 0 to 5V, 5k Ω - can be assigned to trigger mute or preset. Up to 14 x configurable control outputs: 0 to 5V, 440 Ω , 10mA source - can be assigned to drive LED directly Up to 2 x configurable control output can drive 12V relays, 500ma sink
Supported Network protocols	HTTP, Secure Telnet, FTP, POP3/SMTP, NTP, Bonjour, SSL, TCP socket connection
Power supply	100 ~ 240 VAC, 50/60Hz, 40W internal power supply
Power consumption	< 55VA
BTU rating	< 180 BTU/hr
Dimensions (H x W x D)	43 x 440 x 320 mm
Certifications	CE, UL (Pending), ROHS

5.2 I/O card specifications

2 x 2 Analog card		
Description	Analog input & output card	
Channels	2 x balanced input channels	2 x balanced output channels
Frequency response	20 Hz - 20kHz, +/- 0.5dB	20 Hz - 20kHz, +/- 0.5dB
Data format	24bit ADC	24bit DAC
Sample rate	48kHz or 96kHz	48kHz or 96kHz
Analog trim gain/pad	0 to 60dB in 6dB steps	0dB (unity) or -10dB pad
Maximum level, balanced, <1% THD	21dBu @ 0dB gain	20dBu or 10dBu
Dynamic range	>108dBu un-weighted	>108dBu un-weighted
Distortion 20Hz-20kHz @+4dBu	< 0.001%	< 0.001%
Impedance	10k ohms	200 ohms
Phantom Power	+48V - 10mA/ch	n/a
Equivalent Input Noise (EIN), 20Hz-20kHz, @+48dB, Rs = 150Ω	-125dBu	n/a
Connector	Euro-style 3 pin connector	Euro-style 3 pin connector

2 x 2 AES/SPDIF/Toslink card	
Description	Specifications
Digital input format	Selectable between AES-EBU/SPDIF/Toslink Sample Rate Converter (ASRC) allows digital input 8kHz-192kHz
Channels	2 x channels in, 2 x channels out
Frequency response	20 Hz - 20kHz, +/- 0.5dB
Digital output format	Selectable impedance between AES-EBU/SPDIF + Toslink
Sample rate	48kHz or 96kHz
Dynamic range	120dB
THD + N	<-140dB
Impedance	110Ω (AES/EBU), 75Ω (SPDIF)
Connectors	SPDIF/AES EBU: Euro-style 3 pin connector Toslink: Optical receiver, Optical transmitter

5.3 Digital Audio Interface Specifications

Audio Video Bridging interface for streaming of multiple audio channels over Ethernet based networks.

Audio Video Bridging (AVB) Interface		
Description	AVB inputs	AVB Outputs
Channels	16 channels in	16 channels out
Streams	Up to 6 streams	Up to 6 streams
Data format	24bit ADC	24bit DAC
Sample rate	48kHz or 96kHz	48kHz or 96kHz
IEEE standard support	IEEE 802.1as, IEEE 1722, IEEE 802.1Qav IEEE 802.1 Qat (pending), IEEE 1722.1 (Pending)	
Redundancy capability	Dual RJ-45 connector, Dual MAC + Dual PHY Complete level of redundancy for both cable, I.C and firmware	
I.P Addressing	DHCP addressing if DHCP server is found on network Auto-IP address (Link Local Address) if not DHCP found	
Discovery/Control/Naming protocol	ZeroConf based protocol allows naming, self discovery and automatic status update of the devices on the network	
Connectors	Dual RJ-45 connectors	

USB audio 2.0 interface for streaming of multiple audio channels to a USB PC/Mac device.

Multi-Channel USB Audio Playback/Recording interface		
Description	Specifications	
Channels	8 channels in	8 channels out
Frequency response	20 Hz - 20kHz, +/- 0.5dB	20 Hz - 20kHz, +/- 0.5dB
USB transfer	Asynchronous	Asynchronous
Sample Rate	48kHz or 96kHz	48kHz or 96kHz
Resolution	24bit / Uncompressed	24bit / Uncompressed
USB Driver compatibility	Windows / Mac	Windows / Mac
Asio compatibility	Yes	Yes
Connector	Single USB 2.0 Type B connector	
Recording/ Playback software	Compatible with any Win/Mac software supporting multi-channel playback & recording	